



Our Docket No.: 42P13008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chang )

Examiner: Patel, Nhir B.

Application No.: 10/022,760 )

Art Group: 3743

Filed: December 14, 2001 )

For: Use of Adjusted Evaporator )

Section )

Area of Heat Pipe that is Sized  
to Match )

the Surface Area of an

Integrated Heat )

Spreader Used in CPU Packages

in )

Mobile Computers

Commissioner of Patents

P.O. Box 1450

Alexandria, VA 22313-1450

**DECLARATION UNDER 37 CFR 1.131 IN SUPPORT OF PRIOR INVENTION**

Sir :

We, Je Young Chang and Eric DiStefano, declare:

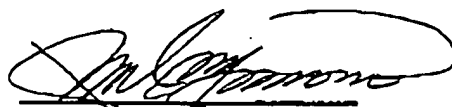
1. We are inventors of the claims of the above-captioned patent application ("the Application") and inventors of the subject matter described therein.
2. Prior to September 19, 2001, the filing date of U.S. Patent No. 6,504,720 cited in an Office Action mailed January 24, 2006, the invention claimed in the Application had been conceived and reduced to practice in the United States.
3. Attached Exhibit A is a redacted copy of an invention disclosure form describing the design of the Use of Adjusted Evaporator Section Area of Heat Pipe That is Sized to Match the Surface Area of an Integrated Heat Spreader Used in CPU Packages in Mobile Computers, and establishes that the subject matter claimed in the Application had been reduced to practice in the United States prior to September 19, 2001.
4. Exhibit A (the invention disclosure) describes the apparatus of a heat pipe with an adjusted evaporator section area that is sized to match the surface area of an integrated hear spreader, as is described and claimed in our application. More specifically, the figure on page 4 of Exhibit A illustrates the features of claim 1. The feature of "an absorber section of a heat pipe attached to a first end of a base of the heat pipe to remove heat from a heat spreader, wherein the absorber section having a size of at least a surface area of the heat spreader" is shown in the bottom figure (b) and described as the "heat pipe with graded evaporator section covering the whol IHS [integrated heat spreader] area." The features of "a dissipater section of the heat pipe attached to a second end of the base of the heat pipe, wherein a width of the dissipater section is greater than a width of the base of the heat pipe, and the dissipater section having a size of at least a surface area of the absorber section" and "a plurality of fins formed of the second end of the base, the

plurality of fins attached to a bottom surface of the dissipater section, the fins having a length equal to the width of the base" are shown in the first figure (a) as the "condenser region with a heat exchanger." Further support for these features is found at page 3, point 1, where it is stated that "different HP widths are proposed between the evaporator region and the other section of the heat pipes."

5. The subject matter claimed in the application was actually reduced to practice prior to September 19, 2001 because the technique claimed in Exhibit A had been successfully implemented before this date, as noted on page 2, point 5 in Exhibit A, where it is stated that simulations had been completed.

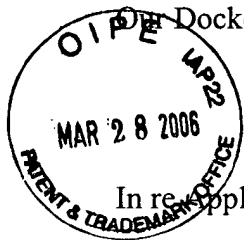
We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Dated: Mar. 21, 2006

  
Je Young Chang

Dated: \_\_\_\_\_, 2006

\_\_\_\_\_  
Eric DiStefano



Docket No.: 42P13008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chang )

) Examiner: Patel, Nhir B.

Application No.: 10/022,760 )

) Art Group: 3743

Filed: December 14, 2001 )

For: Use of Adjusted Evaporator Section )  
Area of Heat Pipe that is Sized to Match )  
the Surface Area of an Integrated Heat )  
Spreader Used in CPU Packages in )  
Mobile Computers )

Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**DECLARATION UNDER 37 CFR 1.131 IN SUPPORT OF PRIOR INVENTION**

Sir :

We, Je Young Chang and Eric DiStefano, declare:

1. We are inventors of the claims of the above-captioned patent application ("the Application") and inventors of the subject matter described therein.
2. Prior to September 19, 2001, the filing date of U.S. Patent No. 6,504,720 cited in an Office Action mailed January 24, 2006, the invention claimed in the Application had been conceived and reduced to practice in the United States.

3. Attached Exhibit A is a redacted copy of an invention disclosure form describing the design of the Use of Adjusted Evaporator Section Area of Heat Pipe That is Sized to Match the Surface Area of an Integrated Heat Spreader Used in CPU Packages in Mobile Computers, and establishes that the subject matter claimed in the Application had been reduced to practice in the United States prior to September 19, 2001.
4. Exhibit A (the invention disclosure) describes the apparatus of a heat pipe with an adjusted evaporator section area that is sized to match the surface area of an integrated hear spreader, as is described and claimed in our application. More specifically, the figure on page 4 of Exhibit A illustrates the features of claim 1. The feature of “an absorber section of a heat pipe attached to a first end of a base of the heat pipe to remove heat from a heat spreader, wherein the absorber section having a size of at least a surface area of the heat spreader” is shown in the bottom figure (b) and described as the “heat pipe with graded evaporator section covering the whol IHS [integrated heat spreader] area.” The features of “a dissipater section of the heat pipe attached to a second end of the base of the heat pipe, wherein a width of the dissipater section is greater than a width of the base of the heat pipe, and the dissipater section having a size of at least a surface area of the absorber section” and “a plurality of fins formed of the second end of the base, the plurality of fins attached to a bottom surface of the dissipater section, the fins having a length equal to the width of the base” are shown in the first figure (a) as the “condenser region with a heat exchanger.” Further support for these features is found at page 3, point 1, where it is stated that “different HP widths are proposed between the evaporator region and the other section of the heat pipes.”

5. The subject matter claimed in the application was not known to practice prior to September 19, 2001 because the technology described in Exhibit A had been successfully implemented before this date, as noted in Paragraph 5 in Exhibit A, where it is stated that simulations had been conducted.

We further declare that all statements made herein are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that statements made like so made are punishable by fine or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful falsification may jeopardize the validity of the application of any patent issuing therefrom.

Dated: \_\_\_\_\_, 2006

\_\_\_\_\_  
Je Young Kim

Dated: 3/23, 2006

\_\_\_\_\_  
Eric Dis...

Rev. 15i, 12/00

Exhibit A

# Intel Invention Disclosure

Attorney-Client Privileged Communication

Located at <http://legal.intel.com>

JUL 13 2001

Date: 07/09/01

mobile  
Platform / IAG1 MPG/MTE

It is important to provide accurate and detailed information on this form. The information will be used to evaluate your invention for possible filing as a patent application. When completed and signed, please return this form to the Legal Department at JF3-147. You can submit electronically via e-mail to "invention disclosure submission" if all of the information is electronic, including drawings and supervisor approval. If you have any questions, please call 264-0444.

RealMedia™ files are linked to portions of this form where you see the media icon. Click these icons to view help.

☒ Overview of this form (please take a moment to view this multimedia presentation).

## 1. Inventor

Last name: Chang	First Name: Je Young	Middle initial:
Phone (408) 765-0969	M/S: RNB-6-53	Fax number: 408) 765-6553
Citizenship: Korea	Contractor (enter yes or no): No	
Inventors email: je-young.chang@intel.com	WWID: 10645419	
Home street address: 640 Pinewood Dr. #1		
City: San Jose	State: CA	Zip code: 95129
<input checked="" type="checkbox"/> Corporate level group: MPG	<input checked="" type="checkbox"/> Division: PDO	<input checked="" type="checkbox"/> Subdivision: MTE
Supervisor: Eric DiStefano	Supervisors WWID: 10583854	
Supervisor phone: (408) 765-7539	Supervisor M/S: RNB-6-53	

## Additional Inventor

Last name: DiStefano	First Name: Eric	Middle initial:
Phone (408) 765-7539	M/S: RNB-6-53	Fax number: 408) 765-6553
Citizenship: U.S.A.	Contractor (enter yes or no): No	
Inventors email: eric.distefano@intel.com	WWID: 10583854	
Home street address: 1535 Frankfurt Way, Livermore, CA 94550		
City: Livermore	State: CA	Zip code:
Corporate level group: MPG	Division: PDO	Subdivision: MTE
Supervisor: James, Gregory A	Supervisors WWID: 10063832	

RECEIVED

JUL 16 2001

PATENT DATABASE GROUP  
INTEL LEGAL TEAM

2. ☒ Title of invention: **Use of graded evaporation section area of heat pipe for the CPU package with IHS in mobile computers**

3. ☒ What technology/product/process does it relate to? (be specific if you can)

TMG/Thermomechanical

4. ☒ Include several key words (and/or code name) to describe the technology area of the invention in addition to #3 above. **Heat pipe, graded evaporator section, package**

5. ☒ Stage of development. (i.e. % complete, simulations done, test chips if any, etc.)  
**Simulations done**

6. ☒ (a) Has description of your invention been, or will it shortly be, published outside of Intel? (check one please)

☐ Yes ☒ No

If yes, was the manuscript submitted for pre-publication approval?

☐ Yes ☐ No

Identify the publication and the date published.

Title:

Date:

☒ (b) Has your invention been used/sold or planned to be used/sold by Intel or others?

☐ Yes ☒ No

If yes, date was or will be sold?

Date:

☒ (c) Does this invention relate to technology that is or will be covered by a SIG(special interest group)/Standard/Specification? (check one please)

☐ Yes ☒ No

If yes, name of SIG/Standard/Specification?

Name:

(d) If the invention is embodied in a semiconductor device, what is the actual or anticipated date of tapeout?

Date:



- ☐ (e) If the invention is software, what is the actual or anticipated date of any beta tests outside of Intel?

Date:

7. Was the invention conceived or constructed in collaboration with anyone other than an Intel blue badge employee or in performance of a project involving entities other than Intel, e.g. government, other companies, universities or consortia?

☐ Yes ☒ No

If yes, please give the name of the individual or entity.

Name:

8. Is this invention related to any other invention disclosure that you have recently submitted?

☐ Yes ☒ No

If yes, please give the title and inventors on the disclosure.

Title:

Inventors:

---

**PLEASE READ AND FOLLOW DIRECTIONS  
ON HOW TO WRITE A DESCRIPTION OF YOUR INVENTION**

Please enter a description of the invention into this form as prescribed below. Use may insert pictures or text as needed.


1. ☐ Describe in detail what components of the invention are and how the invention works.

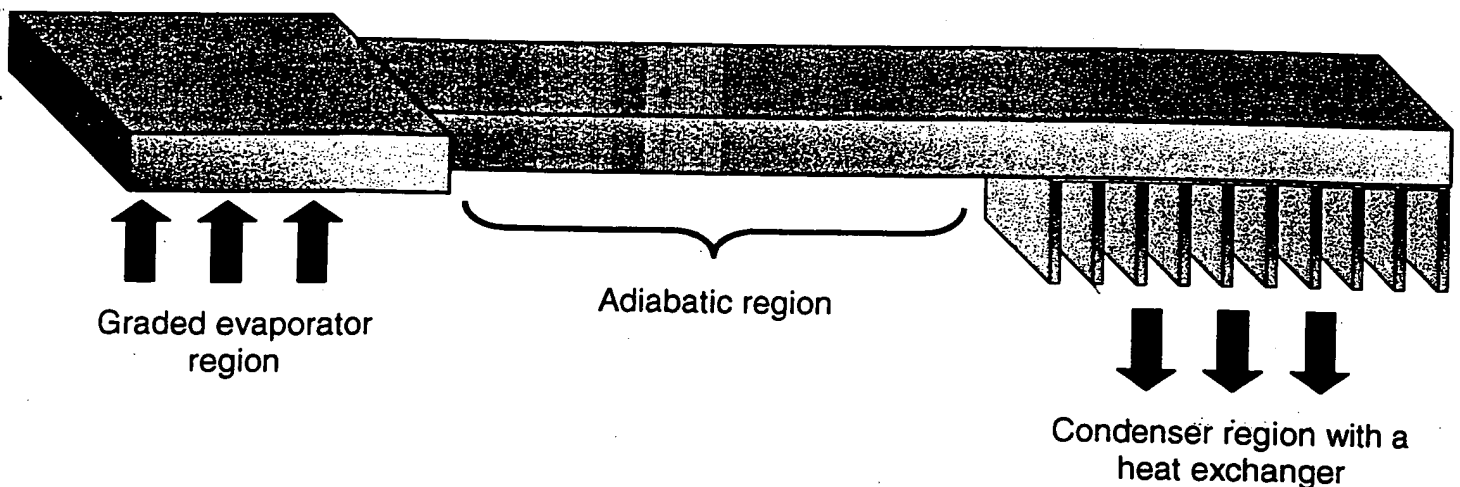
**Description: For most of the high performance CPU's with flip chip package (e.g. Intel CPU), integrated heat spreader (IHS) is attached on top of the silicon die for reducing hot spot issues associated with small die sizes. IHS is made with a thick copper plate (~1.5 mm), which helps spread heat through its thickness.**

**In mobile computers, where a RHE-type (Remote Heat Exchanger) thermal solution has been widely employed, uniform HP width is used throughout the whole heat pipe length. In the present invention, different HP widths are proposed between the evaporative region and the other section of the heat pipes, as illustrated in the attached figure. As shown in the figure, evaporator section of the HP is designed to cover the whole IHS area of the CPU package in order to maximize the evaporation area, and hence, improve the heat pipe thermal performance.**

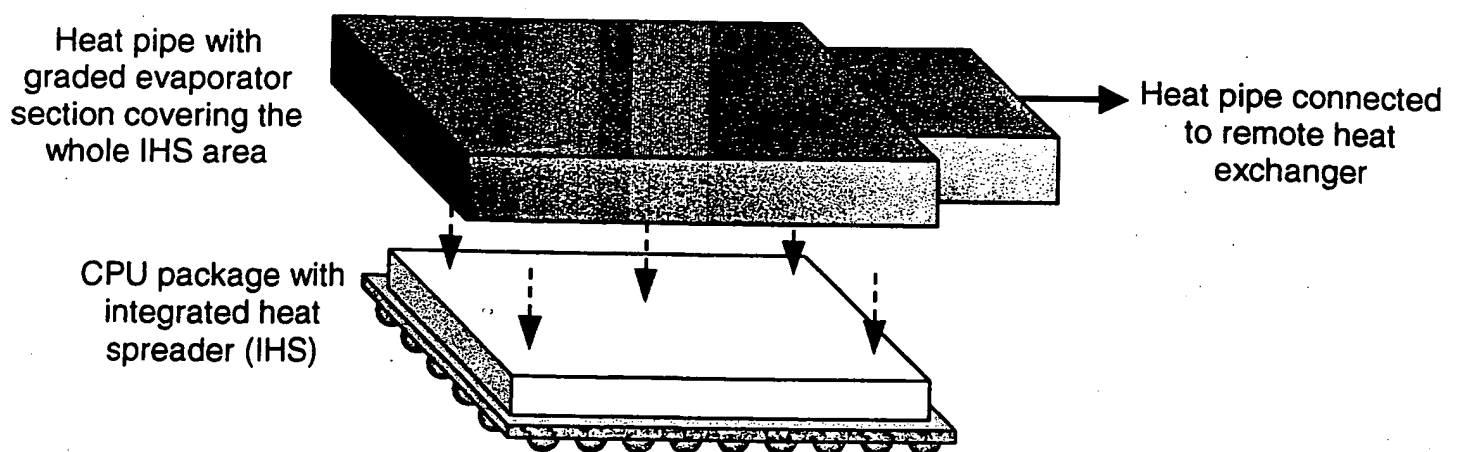
2. ☐ Describe advantage(s) of your invention over what is now done.

**Advantages: Improving evaporative thermal performance of heat pipes.**

3.  You MUST include at least one figure illustrating the invention. If the invention relates to software, include a flowchart or pseudo-code representation of the algorithm.



(a) Overview of the current invention



(b) Application of the current invention with IHS CPU package

Figure. Schematic of heat pipe with graded evaporator section area

4. Value of your invention to Intel (how will it be used?).

Describe value: Allows more heat dissipation for mobile computers, leading to air-cooling capabilities extended.

5. ☒ Explain how your invention is novel. If the technology itself is not new, explain what makes it different.

How is it novel? To inventor's knowledge, the concept of using graded heat pipe area has never been applied in electronic cooling designs, and certainly not for the purpose or in a way described above.

6. ☒ Identify the closest or most pertinent prior art that you are aware of.

Prior art? None

7. ☒ Who is likely to want to use this invention or infringe the patent if one is obtained and how would the infringement be detected? Whoever designs heat pipe thermal solutions for cooling of high heat-flux electronic devices (e.g. Intel CPU). The infringement can be detected by visually inspecting the heat pipe products.

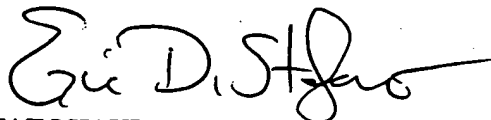
☒ Ready to Submit? Check here first.

☒ HAVE YOUR SUPERVISOR READ, DATE AND SIGN COMPLETED FORM OR FORWARD IT ELECTRONICALLY VIA E-MAIL TO INVENTION.DISCLOSURE.SUBMISSION

DATE:

7/10/01

SUPERVISOR:



BY THIS SIGNING, I (SUPERVISOR) ACKNOWLEDGE THAT I HAVE READ AND UNDERSTAND THIS DISCLOSURE, AND RECOMMEND THAT THE HONORARIUM BE PAID

When completed and signed, please return this form to the Legal Department at JF3-147. You can submit electronically via e-mail to [invention.disclosure.submission@intel.com](mailto:invention.disclosure.submission@intel.com) if all of the information is electronic, including drawings and supervisor approval. If you have any questions, please call 264-0444.

Attach any additional relevant information below: